REMARKS

Claims 1-4 are cancelled, and new claims 5-31 are added. Applicant requests examination of claims 5-31.

Respectfully submitted,

Dated: 12/11/01

By: _____
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PATENT

priority Application Serial No. 09/098,760
priority Filing Date ..... June 17, 1998
Inventor..... R.P. Shah
Assignee..... Johnson Matthey Electronics, Inc.
priority Group Art Unit 1753
priority Examiner ..... S. Versteeg
Attorney's Docket No. 32120
Title: Methods of Forming Metal Articles (As amended)

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING PRELIMINARY AMENDMENT

In the Specification

The replacement specification paragraphs incorporate the following amendments. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

The title has been amended as follows:

~~Metal Article With Fine Uniform Structures And Textures And Process Of Making Same~~

Methods of Forming Metal Articles

At p. 1, before the paragraph beginning on line 6, the following is inserted:

RELATED PATENT DATA

This patent resulted from a divisional application of U.S. Patent Application Serial No. 09/098,760, which was filed on June 17, 1998.

The paragraph beginning at line 16 on page 1 has been amended as follows:

In accordance with the invention there is provided a high purity tantalum article, such as a sputtering target having substantially uniform texture. In particular, the invention

comprises a tantalum sputtering target of at least about 99.95% tantalum and a substantially uniform ~~(100) cubic texture~~ {100 crystallographic orientation}.

The paragraph beginning at line 21 of page 1 has been amended as follows:

A process to provide the tantalum sputtering target is disclosed in Application No. _____ ~~filed on even date herewith~~ 09/098,761 filed on June 17, 1998, the disclosure of said application is expressly incorporated herein by reference. The process comprises:

The paragraph beginning at line 14 of page 2 has been amended as follows:

The rolling reduction per pass is desirably in accordance with a relationship of the minimum reduction per pass, the roll diameter and the ~~desire billet~~ desired billet thickness after forging. Generally, the reduction per pass during rolling is about 10% to 20% per pass.

The paragraph beginning at line 25 of page 5 has been amended as follows:

Strain in equation (2) is high enough to optimize static recrystallization only for thin targets. But even for these targets non-uniformity in strain distribution through a billet volume may significantly reduce the amount of strain in some areas. Also, demands on capacity of a forging press or rolling mill necessary to provide strains of equation (2) above for large target billets may be too high for some applications. Therefore, there may be restrictions on attainable strains by rolling or forming operations.

The paragraph beginning at line 3 of page 11 has been amended as follows:

Metallic elements by ICP (iInductively Coupled Plasma) or GDMS (Glow Discharge Mass Spectroscopy) analysis.

The paragraph beginning at line 5 of page 11 has been amended as follows:

~~Or GDMS (Glow Discharge Mass Spectroscopy) analysis.~~ Billets were upset-forged at room temperature to a thickness of 75 mm. Teflon films of 150 x 150 mm2 can thickness of 1.2 mm were used as lubricants for frictionless upsetting (alternatively frictionless upset-forging can also be performed at 300 deg. C). Thereafter cold rolling with a roll diameter of 915 mm was performed in sixteen passes with partial reductions of 12% per pass along four directions under an angle of 45°.

The paragraph beginning at line 14 of page 11 has been amended as follows:

Coupons across the thickness of the rolled billet were cut from central, mid-radius and external areas and annealed at different temperatures during 1 hours (h) and investigated for structure and texture and photomicrographs thereof are shown in FIGS. 1-6. FIGS. 1-3 are photomicrographs of the center, mid-radial and edge, respectively, showing the fine grain structure of a tantalum target. FIGS. 4-6 are graphs showing ~~(100) cubic texture~~ {100} crystallographic orientation at the center, mid-radial and edge--.

The paragraph beginning at line 9 of page 12 has been amended as follows:

Step 1: Anneal the billet in vacuum.

The paragraph beginning at line 11 of page 12 has been amended as follows:

Step 2: Upset-forge billet using teflon as a solid lubricant at room temperature or at 527F to specific height required for rolling.

The paragraph beginning at line 13 of page 12 has been amended as follows:

Step 3: Fly-cut surfaces of the forged billet.

The paragraph beginning at line 16 of page 12 has been amended as follows:

Step 5: Anneal in vacuum to obtain a fine grain size and uniform texture.

The paragraph beginning at line 20 of page 12 has been amended as follows:

Step 1: Upset-forge using teflon to a height such that Mo = 1.0.

The paragraph beginning at line 23 of page 12 has been amended as follows:

Step 3: Upset-forge billet using teflon to a final height as required for rolling operation.

The paragraph beginning at line 25 of page 12 has been amended as follows:

Step 4: Fly-cut the surfaces of the forged billet.

The paragraph beginning at line 32 of page 12 has been amended as follows:

Step 1: Anneal the billet in vacuum.

The paragraph beginning at line 3 of page 13 has been amended as follows:

Step 3: Fly-cut surfaces of the forged billet.

The paragraph beginning at line 6 of page 13 has been amended as follows:

Step 5: in vacuum to obtain a fine grain size and uniform texture.

The paragraph beginning at line 13 of page 13 has been amended as follows:

Step 1: Anneal the billet in vacuum.

The paragraph beginning at line 12 of page 13 has been amended as follows:

Step 2: Upset-forge billet ~~uisng~~ using teflon as a solid lubricant at room temperature or at 572F.

The paragraph beginning at line 13 of page 13 has been amended as follows:

Step 3: Fly-cut surfaces of the forged billet.

In the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

1-4 (cancelled)

New claims 5-31 (listed above) are added.